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Forest Insect and Disease Conditions in Alaska in 1978

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Forest Insect And Disease Conditions in Alaska in 1978. U.S. Department of Agriculture, Forest Service, Alaska Region, Division of State and Private Forestry (Pouch 6606, Anchorage, Alaska 99502). Alaska Region report number 62, August 1979.

Cover: The Large Aspen Tortrix, an insect that defoliates trees, widened its activity in south-central Alaska in 1978. In 1966–69, it caused extensive defoliation in interior Alaska.

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Forest Insect and Disease Conditions in Alaska in 1978

Conditions in Brief

Bark beetle activity continued to cause the most insect damage to forested areas in Alaska during 1978. Infestations covered 50,962 hectares (1 hectare equals 2.471 acres) throughout south-central and interior Alaska. Heavy white spruce mortality is occurring on 6,201 hectares of the Chugach National Forest, an increase of 1,142 hectares over the acreage infested in 1977. Volume loss has been estimated at 4,097 boardfeet per acre over a 3-year period on parts of the Chugach. Scattered mortality of white spruce by *Ips* is occurring on 800 hectares along the Porcupine River. Eastern larch beetle infestations in the interior have dramatically decreased from 215,297 hectares in 1977 to 14,403 hectares in 1978.

The most wide-spread defoliation in Alaska was caused by blotch miners, the large aspen tortrix and leaf rollers. Tortrix larvae heavily defoliated 8,547 hectares of aspen in south-central Alaska. Blotch miners damaged approximately 208,822 hectares of aspen and alder near Fairbanks. The spruce budworm was, for the first time, collected in large numbers in localized areas around Anchorage, the Kenai Peninsula, and Fairbanks. Leaf roller activity significantly decreased from the 21,000 hectares infested in 1977. Only 5,869 hectares of leaf roller activity were aerially detected in 1978.

In southeast Alaska, western black-headed budworm and hemlock sawfly populations continued to remain endemic. Moderate and scattered spruce aphid damage to Sitka spruce occurred at Point Vandeput in the Thomas Bay area of the Stikine Area and at the Sitka National Monument near Sitka. The saddleback looper, a defoliater of western hemlock, was collected in increased numbers south of Frederick Sound.

Hemlock dwarf mistletoe, *Sirococcus* shoot blight, and needle rust of white and black spruce continue to be the most damaging tree diseases in Alaska. A total of 279,644 hectares of white spruce were lightly infected and 29,637 hectares were heavily infected by needle rust along the Porcupine and Yukon Rivers in interior Alaska.

Status of Insects

Spruce Beetle, *Denroctonus rufipennis* (Kby)

The spruce beetle remained the most damaging forest insect in Alaska; infestations covered approximately 50,962 hectares throughout south-central and interior Alaska (fig. 1). White spruce mortality is occurring on 6,201 hectares of the Chugach National Forest, an increase of 1,142 hectares (18 percent) over the acreage infested in 1977. This increase was a result of a ''new'' 826-hectare infestation along Summit Lake and 316 hectares of scattered beetle-caused white spruce mortality occurred around Upper Russian Lake. About 3,480 hectares of heavy spruce mortality is still occurring on the 5,059-hectare spruce beetle infestation located along the Resurrection Creek drainage on the Kenai Peninusla; a high value recreational area. In 1976 a 5-year impact study was initiated in the Resurrection Creek drainage to monitor spruce beetle activity.

A 3-year interim report has been completed. Volume was estimated to be approximately 15,000 boardfeet per acre. Volume loss that can be attributed to spruce beetles amounted to 4,097 boardfeet per acre over a 3-year period. This is 27 percent of the total volume per acre. However, it appears that from Caribou Creek to East Creek (area of initial infestation) the spruce beetle infestation is static-to-declining.

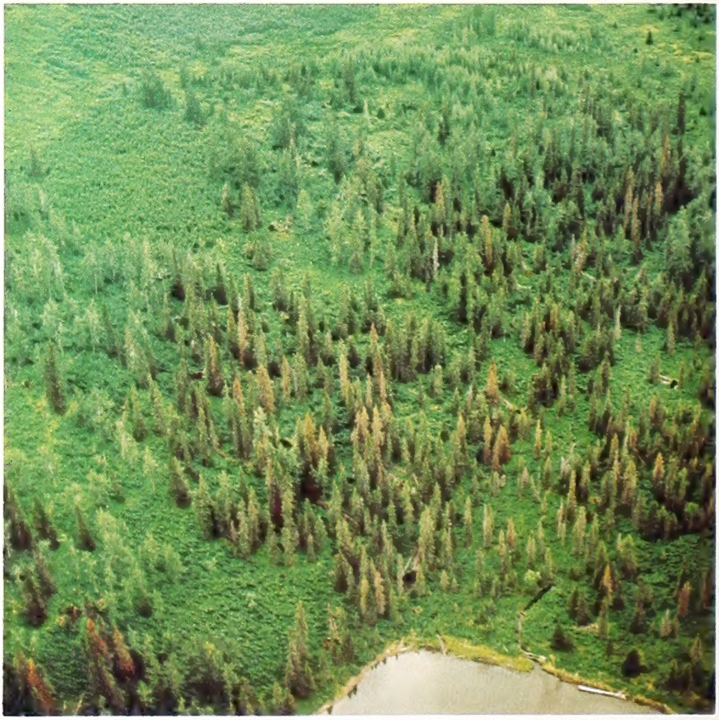


Figure 1—Spruce beetle infestation at Summit Lake.

On the other hand, 1978 aerial surveys detected more intense beetle activity higher on the slopes—up to tree line. Increased mortality can be expected in these areas for a few years.

Ground surveys were conducted in the vicinity of Summit Lake Lodge on the Chugach National Forest during September, 1978, to determine spruce beetle population status and to gather white spruce growth and stocking information. Mean spruce radial growth (expressed as the number of rings per last inch) is 24 + 10. The majority of the spruce are between 80 and 120 years old. Results, based on Knight's Sequential Sampling Plan, indicated an increasing trend in spruce beetle populations. Mean basal area for plots containing spruce ranges from 20 to 200 square feet per acre. It appears that the beetles are operating in those portions of the stand where basal area is greater than 80 square feet. Given the distribution of spruce within the area and the beetle population trend, this infestation will probably continue at its current rate for 5 to 10 years.

Elsewhere on the Kenai Peninsula, spruce beetle activity is increasing over 1977 levels. A total of 18,500 hectares of white spruce is infested throughout the Kenai National Moose Range and Chickaloon Flats. The area of heaviest infestation (3,000 hectares) is located near Barbara Lake.

Spruce beetle activity on the west side of Cook Inlet has increased over the 1977 low level. Approximately 25,217 hectares of very light (0.5 infested tree per hectare) white spruce mortality was aerially detected near lower Beluga Lake. This increase is of minor economic concern as most of the susceptible commercial spruce has already been killed during the Typonek outbreak late in the sixties and early in the seventies. Salvage operations are continuing on these affected State lands. As of October 1978, a total of 58.9 MMbm (million boardfeet measure) of white spruce was harvested on the Westside Salvage Timber Sale. Seventy-five percent of this volume was beetle-killed timber. Hardwood volume cut was 13.3 MMbm of birch and 14.7 MMbm of cottonwood.

Throughout interior Alaska, light spruce beetle activity was detected on 1,044 hectares of forested lands. The largest infestation (941 hectares) is located 11 kilometers south of Devil's Elbow on the Kuskokwim River.

Eastern Larch Beetle, *Dendroctonus simplex* (LeC.)

Eastern larch beetle infestations in the interior have dramatically decreased from 215,297 hectares in 1977 to 14,403 hectares in 1978. The infestation is moving northeastward from where it was initially detected in 1974 along the upper Kantishna River drainage. Scattered mortality is also occurring along the Tanana River near Fairbanks. A buildup of the beetle west of Anvik may occur during the next few years, as scattered infested trees were noted in well stocked stands.

Tamarack varies considerably in stand density within the infested area; it is widely scattered over much of the area with localized concentrations of fairly dense growth. However, it appears that most of the susceptible tamarack has been infested in the last 3-years, and larch beetle activity has essentially run its course.

Engravers, *Ips pertubatus* (Eichh.)

Ips infestations have increased in interior Alaska over the 1977 endemic levels. Eight hundred hectares of fading white spruce were aerially detected during the 1978 survey. The largest infestation, approximately 500 hectares, was located along the Porpupine River southwest of Fishhook Bend. The status and severity of this outbreak will be evaluated in spring 1980.

Cottonwood Leaf Beetle, *Chrysomela scripta* F.

Outbreaks of leaf beetles occur periodically on cottonwood, balsam poplar, and aspen throughout southeast and interior Alaska. Although of little importance as far as wood products are concerned, defoliation by leaf beetles causes concern for plantings used for landscape purposes.

In 1978, moderate defoliation of cottonwood occurred thoughout the Mendenhall Valley, north of Juneau. However, the 40,470 hectares of 1977 leaf beetle outbreak on aspen between Delta Junction and Tok, southeast of Fairbanks, have dramatically decreased. No visible defoliation was aerially detected in 1978.

Cedar Bark Beetle, *Phloeosinus* spp.

Cedar mortality was observed at various locations on the Stikine Area of the Tongass National Forest. On mountain slopes, mortality is confined to more or less circular pockets of Alaska yellow cedar. Cedar near the center of these pockets appears to have been dead for several years; current mortality is generally confined to the outer edges. On more level terrain, cedar mortality seems to be scattered over larger areas and is interspersed with spruce and hemlock. Numerous areas of cedar mortality were detected on Kuiu, Kupreanof, Mitkof, Zarembo and Wrangell Islands. Additional mortality is probably occurring on parts of Prince of Wales Island, small neighboring islands, and sections of the mainland. The infestation appears more active in 1978 compared to 1976 and 1977.

On August 30, 1978, an affected stand in Pillar Bay of Kuiu Island was ground checked. Terrain was relatively level, and water drainage was poor. Cedar mortality was interspersed among spruce and hemlock. Foliage of the most recently killed cedar was rust colored. No insect feeding of foliage was evident. Bark beetle galleries and larvae, probably *Phloeosinus* spp., were found underneath the bark of several dying Alaska cedar. However, no signs of insect activity were found in other dying cedar.

Region 10 pathologists have suggested that root disease(s) could be the primary cause of tree mortality or that root disease might predispose cedar to bark beetle infestations. A joint administrative study involving entomologists, a pathologist, and a Stikine Area forester has been proposed to identify the cause agent(s) responsible for cedar mortality.

Large Aspen Tortrix *Choristoneura conflictana* (Wlk

This defoliator (figs. 2 and 3) caused extensive defoliation throughout the interior during 1966–69 where aspen suffered defoliation within a 10,000-square-mile area. Until 1978, populations were at endemic levels. However, populations of this aspen defoliator increased dramatically in 1978. A total of 8,547 hectares of heavy Tortrix defoliation was aerially detected in south-central Alaska. This infestation is located approximately 5 kilometers west-southwest of Willow. One hundred percent defoliation occurred on many sites. Affected stands included paper birch and aspen with a scattered understory of white spruce. On the most severely infested areas, some feeding and webbing occurred on the birch and spruce. Most of the defoliated trees refoliated by the end of August. Laboratory rearings of larvae collected from the heavier defoliated areas resulted in at least 50 percent parasitism by the wasp, *Glypta inversa* Cress, and a diperan parasite, *Omotoma* spp. This high degree of parasitism indicates that the Tortrix infestation has been occurring in some areas for 2 or more years. This population will be carefully monitored in 1978 to evaluate its rate of spread and damage. Tortrix populations are likewise gradually increasing in the interior aspen forests. However, damage was minimal and was detected only by ground surveys.

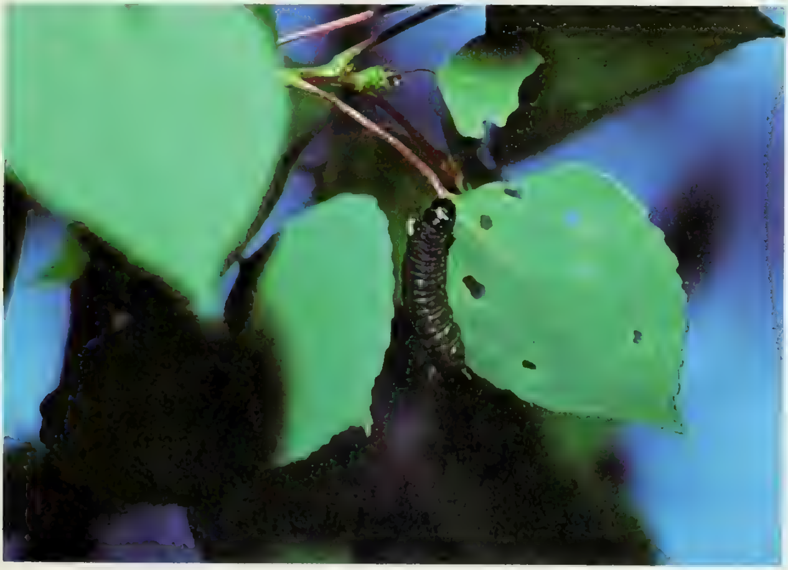


Figure 2—Large aspen Tortrix larva, *Choristoneura conflictana* (Wlk.). Note parasitic fly maggot (probably *Omotoma* sp.) feeding on larva.

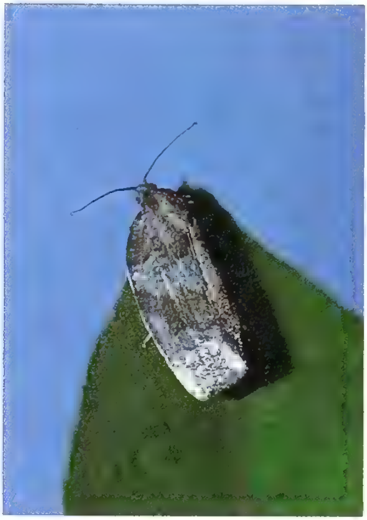


Figure 3—Large aspen Tortrix adult, *Choristoneura conflictana* (Wlk.).

Leaf Rollers, *Epinotia solandriana* L.

Leaf roller activity in south-central Alaska significantly decreased from the 21,000 hectares infested in 1977. Only 5,869 hectares were aerially detected in 1978. The majority of this defoliation occurred on birch in the Anchorage bowl. However, increased tree mortality, especially in urban areas, occurred as a result of 3 to 4 years of consecutive defoliation.

A combination of light-to-moderate leaf roller defoliation and poor drainage resulted in visible defoliation on 3,019 hectares of quaking aspen on the Kenai Peninsula. About 2,833 hectares of this defoliation was located from Bottenintnin Lake, along the Sterling Highway to Soldotna.

Studies undertaken in the Spring and Summer of 1978 demonstrated that at least 80 percent of the leaf rolling is caused by one insect, *Epinoti soladriana* (fig. 4). This leaf roller has a 1-year lifecycle, overwintering as a egg on birch twigs and branchlets.

The reduction in 1978 leaf roller activity was probably because of unfavorable weather conditions for insect development. Summer temperatures were below normal, and higher than normal precipitation occurred throughout the month of June. Based on the results of the 1978 investigations, 1979 leaf roller populations will remain the same as 1978 levels. If 1979 summer weather is the same as that of 1978, we can expect moderate leaf rolling with scattered branch dieback and tree mortality.

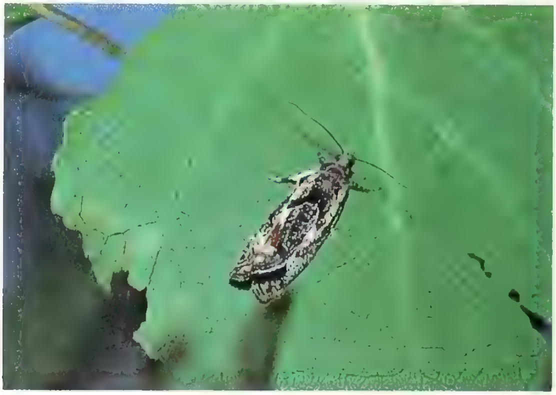


Figure 4—Adult leaf roller, *Epinotia solandriana* L..

Spruce Budworm, *Choristoneura* spp

Ground surveys detected significant budworm damage to white spruce in many residential and park areas of Anchorage. Likewise, budworm larvae were collected in low numbers near Hope, on the Kenai Peninsula, and near Fairbanks (figs. 5 and 6). This is the first time that this potentially serious conifer defoliator has been located this far north. Ample numbers of larvae and adults were collected. Specimens have been sent to appropriate taxonomists. Efforts will be undertaken next year to determine spruce budworm life-history and the impact of this defoliator.

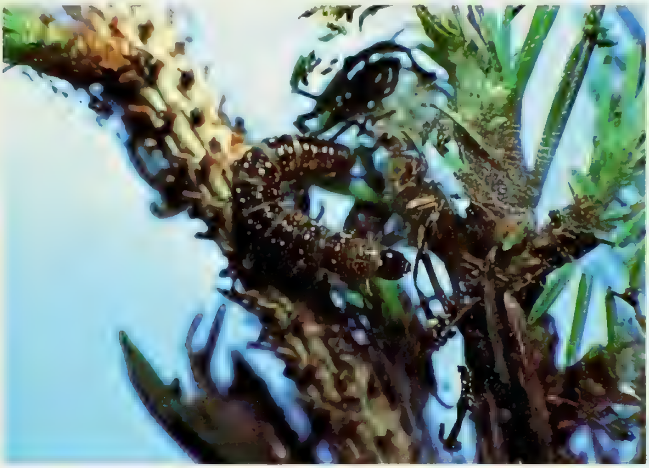


Figure 5—Spruce budworm larva (*Choristoneura* sp.) feeding on white spruce.

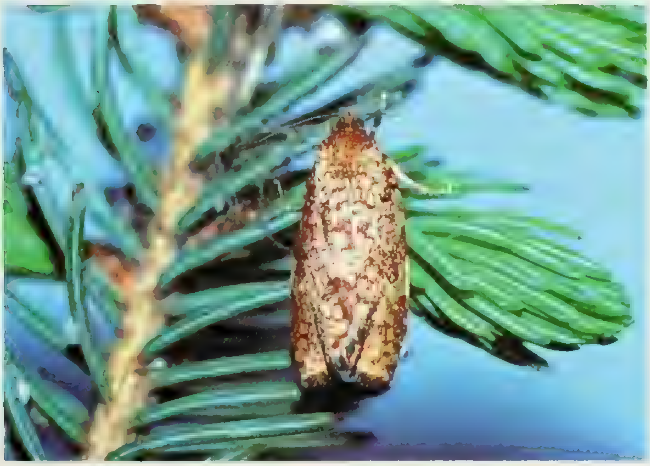


Figure 6—Adult spruce budworm (*Choristoneuar* sp.).

Western Blackheaded Budworm, *Acleris gloverana* (Wlshm)

Populations of this potentially destructive defoliator of western hemlock and Sitka spruce in southeast Alaska have continued to remain endemic since early in the seventies. Aerial surveys conducted over most of the hemlock-spruce forests that blanket the Alaska panhandle failed to reveal tree defoliation. However, larval population counts indicated that a slight budworm buildup is occurring on the northwest end of Prince of Wales Island. Specifically, two monitoring locations (Colder Bay and Tuxecan) had substantial increases in larval numbers over the 1977 counts.

Hemlock Sawfly, *Neodiprion tsugae* (Midd.)

Hemlock sawfly populations continue to remain endemic in 1978. Sawfly larval population samples did not result in significant numbers of larvae.

Although sawfly population levels are expected to remain at low levels during 1979, mild winter weather conditions could result in an increase in populations, causing visible defoliation of western hemlock.

Spruce Aphid, *Neomyzaphis abientina* (Wlkr)

Spruce aphids caused moderate damage to Sitka spruce throughout southeast Alaska. Most notably, spruce were moderately defoliated at Point Vandeput in the Thomas Bay area of the Stikine Area and at the Sitka National Monument near Sitka on the Chatham Area of the Tongass National Forest.

A ground survey (fig. 7) undertaken at the end of June indicated 3-years of varying degrees of defoliation resulting in some lower branch mortality in the Sitka National Monument. Defoliation was very heavy on large mature Sitka spruce along the tidewater. Continued heavy defoliation in 1979 could result in some tree mortality.

Saddleback Looper, *Ectropis crepuscularia* (Denis and Schniff.)

This defoliator of western hemlock was collected in increased numbers during the larval monitoring survey conducted at 80 permanent locations. All of the monitoring locations where saddleback looper larvae were collected were south of Frederick Sound.

Although saddleback looper populations appear to be well below those levels that are necessary before visible tree defoliation is evident, this looper is a potential threat to western hemlock in southeast Alaska.

Bloch Miner, *Lithocolletis ontario* (Free.)

Ground and aerial surveys detected blotch miner damage on quaking aspen on 209,000 hectares near Fairbanks for the second year. Defoliation is scattered over an area from Manley Hot Springs to the northwest, down to Nenana (south-

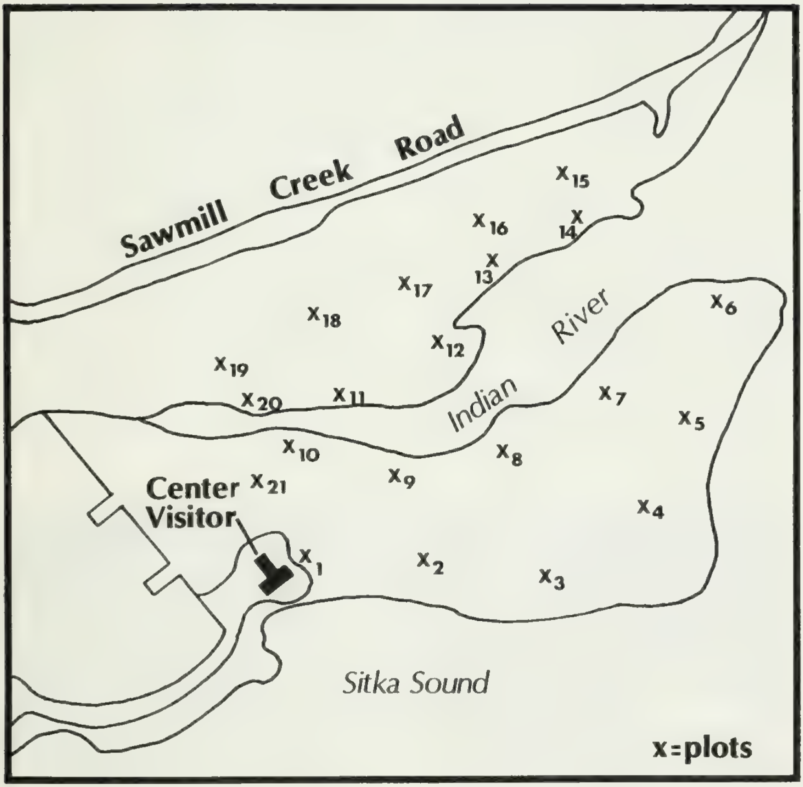


Figure 7 — Spruce aphid defoliation plots at Sitka National Monument

east), and northeast to Fairbanks. However, little or no branch dying or tree mortality observed. At worst, this defoliation will probably result in a small growth loss.

A Larch Defoliator, *Zeiraphera* spp.

Populations of this budmoth have remained at endemic levels for the second consecutive year. No visible defoliation was detected during 1978 aerial surveys. Specific identification is still pending.

Status of Diseases

Hemlock Dwarf Mistletoe, *Arceuthobium tsugense* (Rosend.) G.N. Jones

Hemlock dwarf mistletoe (fig. 8) received the greatest attention in 1978. Surveys to determine the location and density of infected residuals on logged areas were conducted. August 6,143 hectares were examined on the Ketchikan Area, 5,734 hectares near Thorne Bay off Prince of Wales Island, and 769 hectares near Shoal Cove off Revillagigedo Island. On the Chatham Area, a contract was let for the removal of infected residuals on 401 hectares in the Sitkoh Valley on Chichigof Island. Forty-nine hectares of the control work have been completed.

A study has been started in cooperation with the Forest Sciences Laboratory in Juneau to determine the percentage of infections in young growth under infected residuals. To date 1,386 trees on 12 plots on Hecata Island and 601 trees on 4 plots on Prince of Wales Island have been examined.

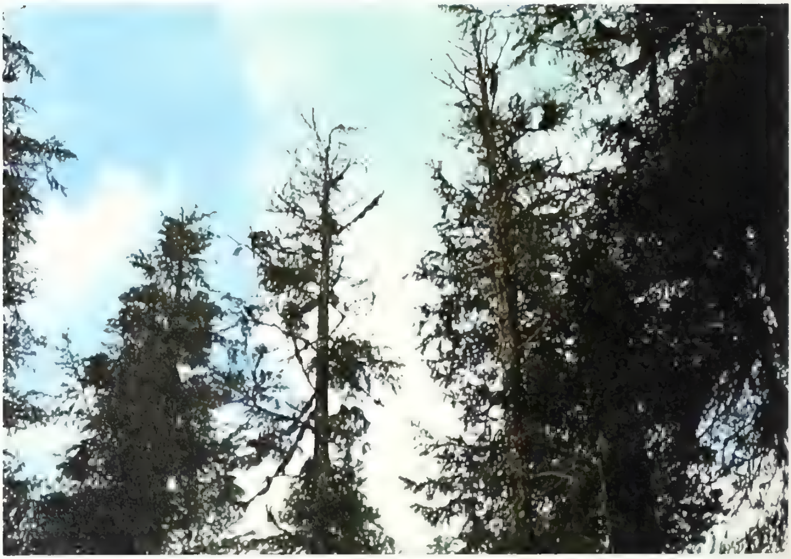


Figure 8—Western hemlock mortality probably caused by Hemlock dwarf mistletoe, *Arceuthobium tsugense* (Rosend.) G.N. Jones.

Sirococcus Shoot Blight, *Sirococcus strobilinus* Preuss.

Sirococcus shoot blight remains very active in reproduction throughout southeast Alaska. Thomas Bay is still the "hot spot" with the highest levels of infection being in the fertilized areas. The disease was found in all areas—unthinned, thinned, fertilized, nonfertilized, and combinations of the treatments. Despite the high levels of infection, it appears that little damage is suffered by the potential crop trees.

A high level of infection was observed on 15-to-20-year-old reproduction stands at Yakutat. But, little permanent damage was being done.

A single mountain hemlock sapling located in an old-growth hemlock-spruce stand on Mitkof Island was found with shoot blight. This is the first incidence of *Siroccoccus* infecting mountain hemlock in Alaska.

Armillaria Root Rot, *Armillariella mellea* (Vahl. ex Fr.) Karst

Armillaria root rot is selectively killing western hemlock throughout a 35-to-45 year-old stand of mixed hemlock-spruce on Kosciusko Island. The fungus was noted on all of the mistletoe study plots in this area. On one plot, 40 percent of the hemlock had been killed.

Spruce Needle Rust, *Chrysomyxa ledicola* Lagerh.

A large increase in spruce needle rust was observed during the 1978 interior Alaska aerial survey. A total of 309,381 hectares were infected. There were 279,644 hectares of white and black spruce lightly infected (less than 0.5 tree per hectare) on the upper Porcupine River between the Canadian border and the Colleen River. However, up to 90 percent of the current year's needles of white spruce were infected on 29,637 hectares northwest and east of Ruby (fig. 9). Likewise, 8,087 hectares of spruce needle rust were observed northwest of Lake Chauekuktali (Taylor Mountains Quandrangle) and north of Dillingham. All age classes were affected. Such an intense epidemic may have a serious effect on the following year'growth.

Spruce needle rust was endemic throughout south-central and southeast Alaska. Two hundred and fifty hectares of light infection were detected on spruce near the Russian River on the Kenai Peninsula.

Frost Damage on Aspen

A late frost defoliated approximately 4,400 hectares of quaking aspen southwest of Levengood (interior Alaska). However, not all the aspen was equally affected. Those clones which foliate early in the season were hardest hit. Some clones in the frost-affected area remained free of damage.

Air Pollution

Trees near the pulp mills at both Ketchikan and Sitka continue to die. A foliar analysis (for total sulfur) of conifer needles near the Ketchikan pulp mill showed total sulfur content of needles as high as 4,800 parts per million compared to a background total sulfur content of 500 to 700 parts per million.

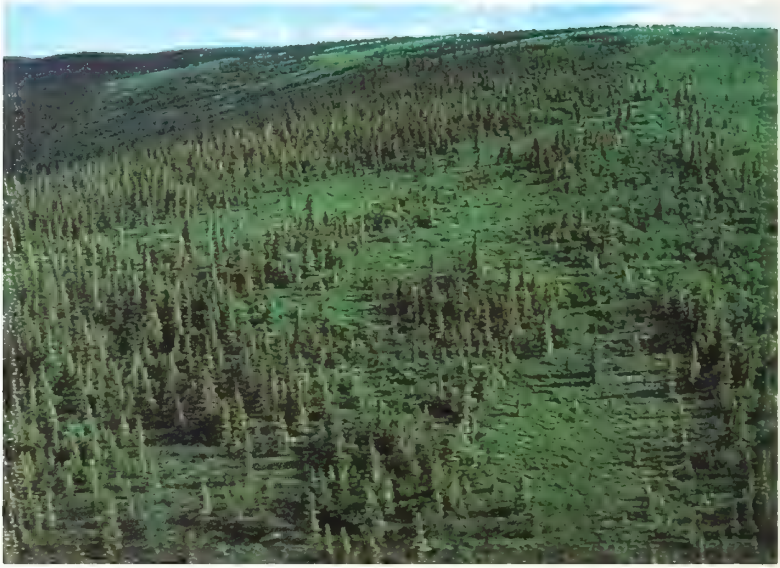
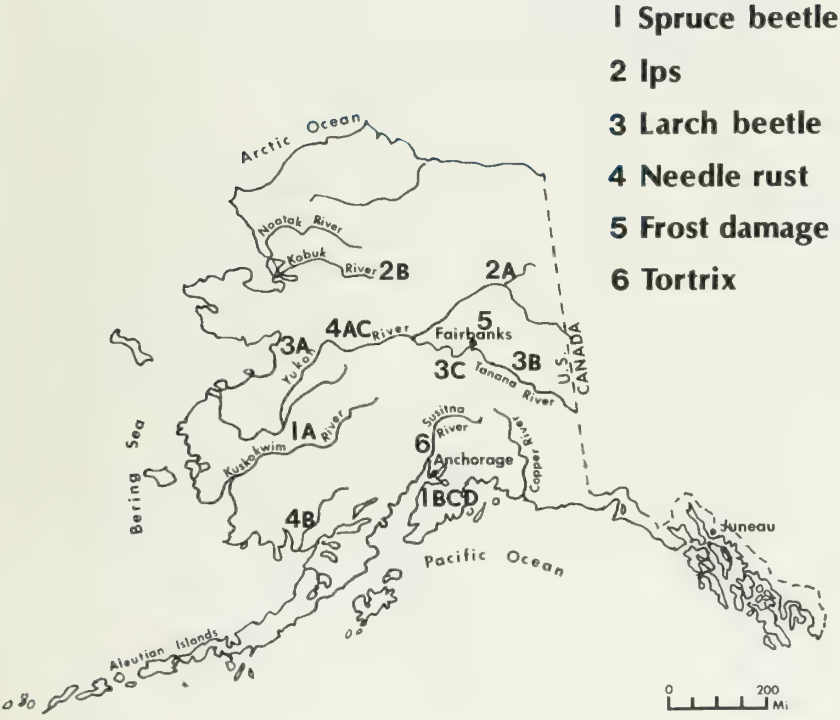


Figure 9—White spruce infected by spruce needle rust, Chrysomyxa ledicola Lagerh., northwest of Ruby (Interior Alaska).

Note to Users

To obtain specific information concerning distributions of major forest insect and disease activity in Alaska, first refer to the numbered index map (Appendix A). After selecting the general area of a forest insect or disease problem, refer to the specific quadrangle map (Appendix B). Each map is based on a Geological Survey 1:250,000 Quadrangle. The name of the Quadrangle is printed on each of these smaller reference maps. Only the larger and more important forest pest problems are mapped, such as spruce beetle, *Ips* beetle, larch beetle, large aspen tortrix, spruce needle rust, and frost damage on aspen.

Appendix A

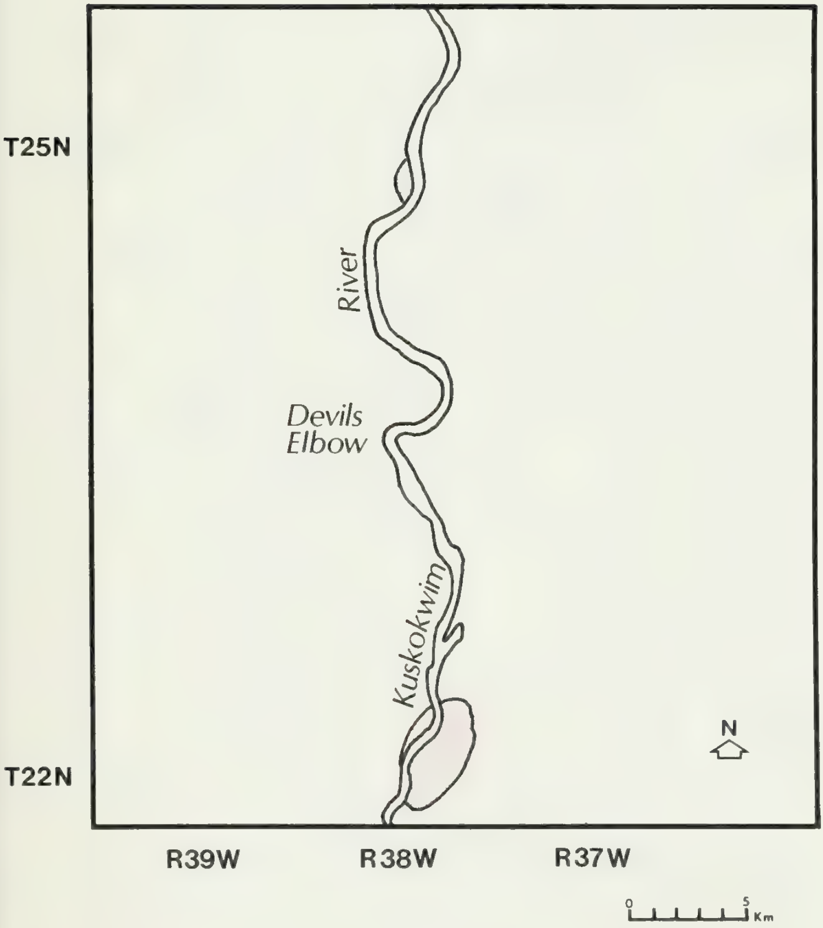


General forest insect and disease distribution map

Appendix B

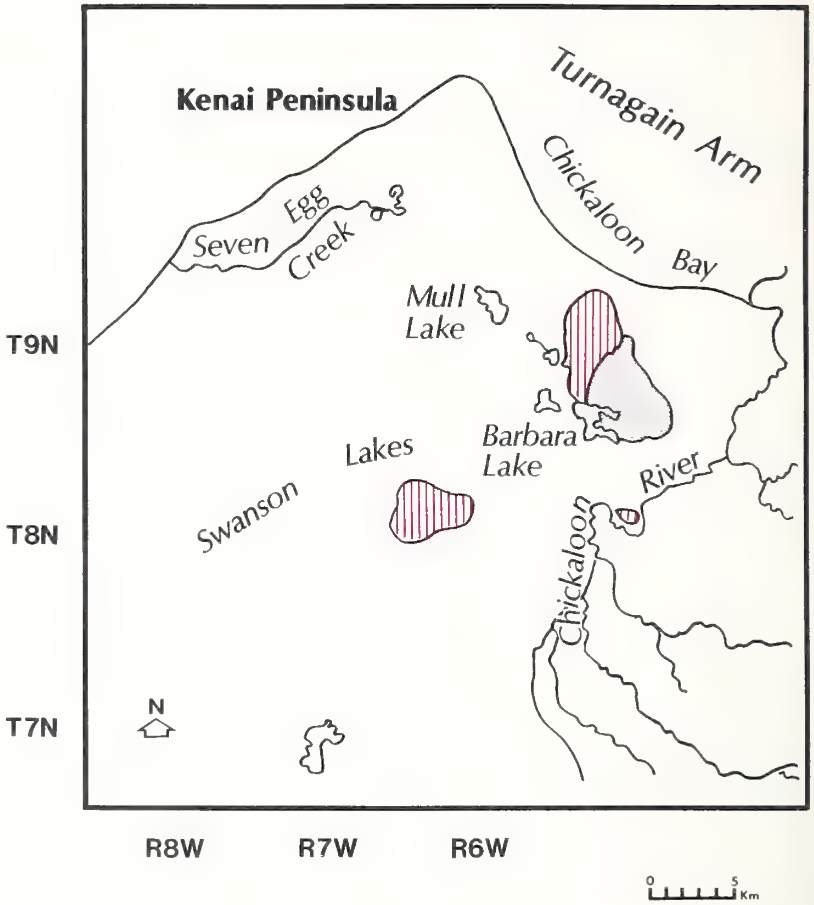
Specific forest insect and disease distribution maps

1A
Iditarod



Moderate spruce beetle activity

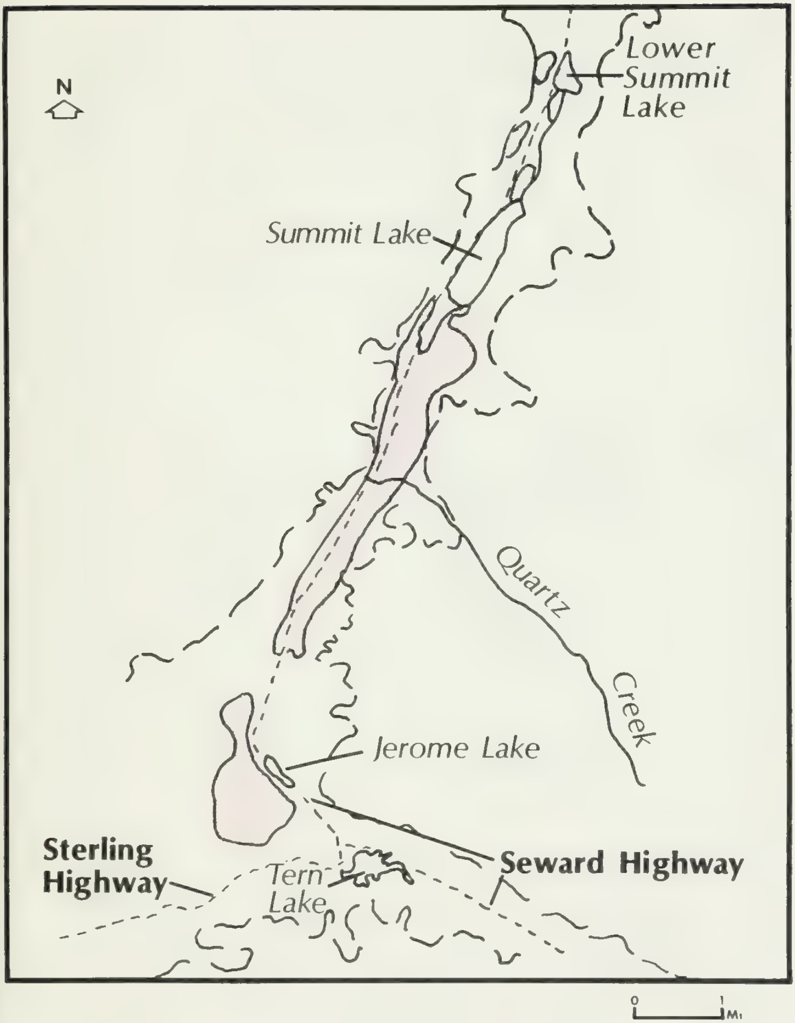
1B
Kenai



Heavy beetle activity ■

Moderate beetle activity ▥

1C
Summit Lake

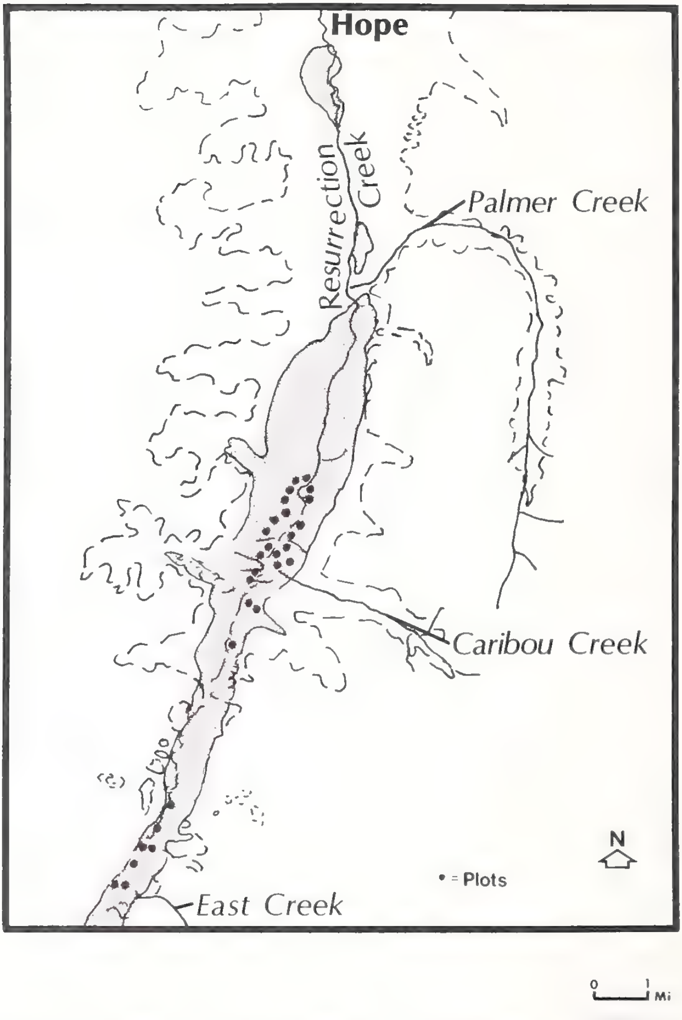


Heavy spruce beetle activity ▨

White spruce forest boundary ⌣ ~

1D

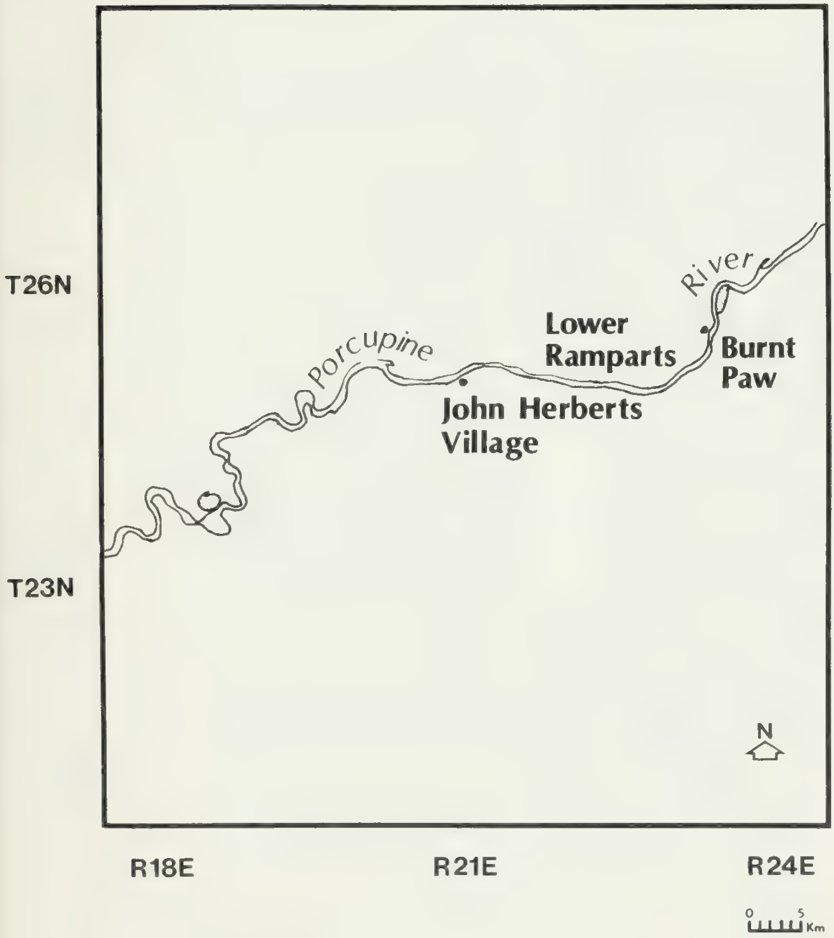
Resurrection Trail spruce beetle impact survey



Heavy spruce beetle activity ▨

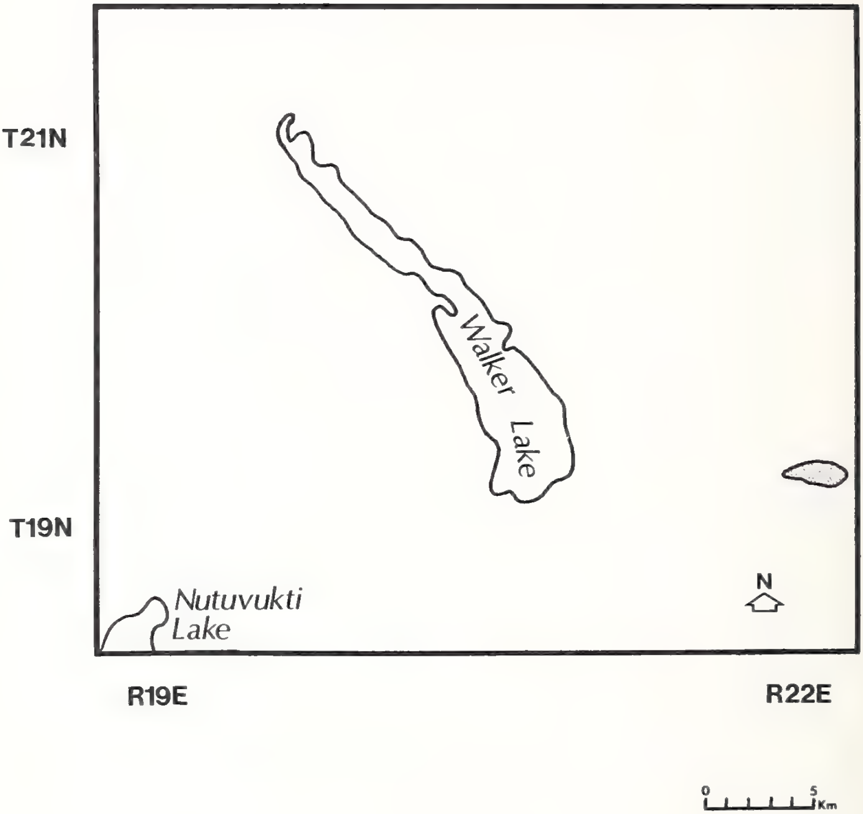
White spruce forest boundary ~~

2A
Black River - Coleen



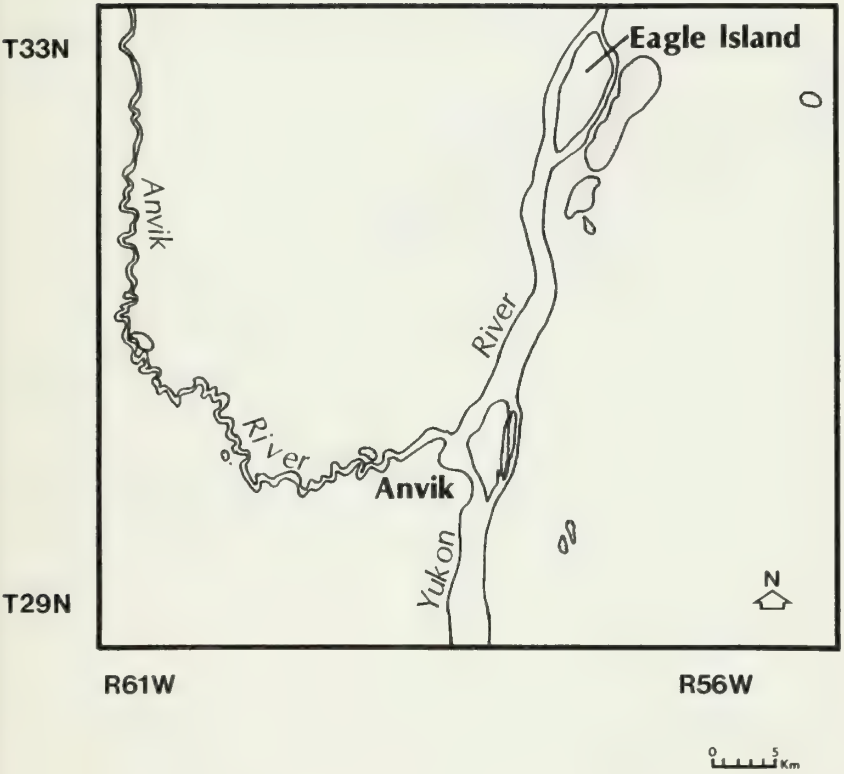
Heavy Ips attack

2B
Survey Pass



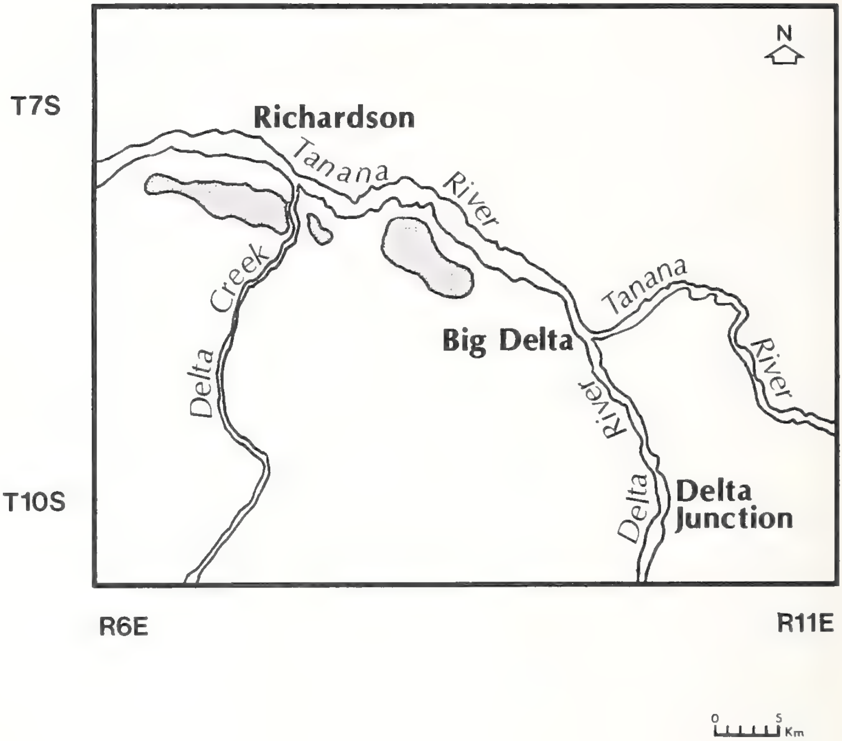
Heavy Ips attack

3A
Holy Cross



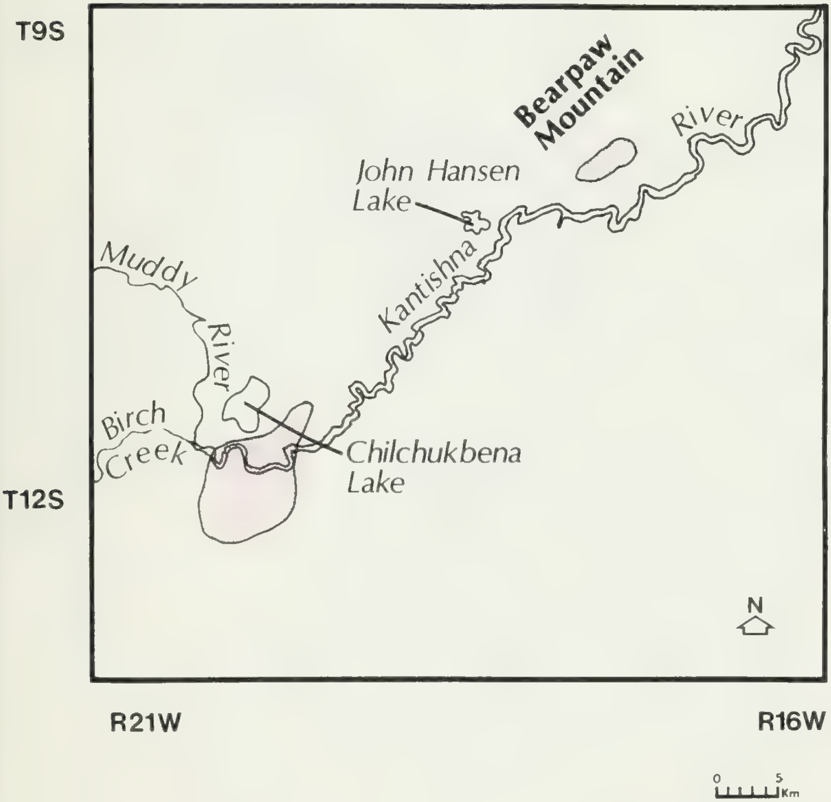
Scattered larch beetle activity

3B
Big Delta



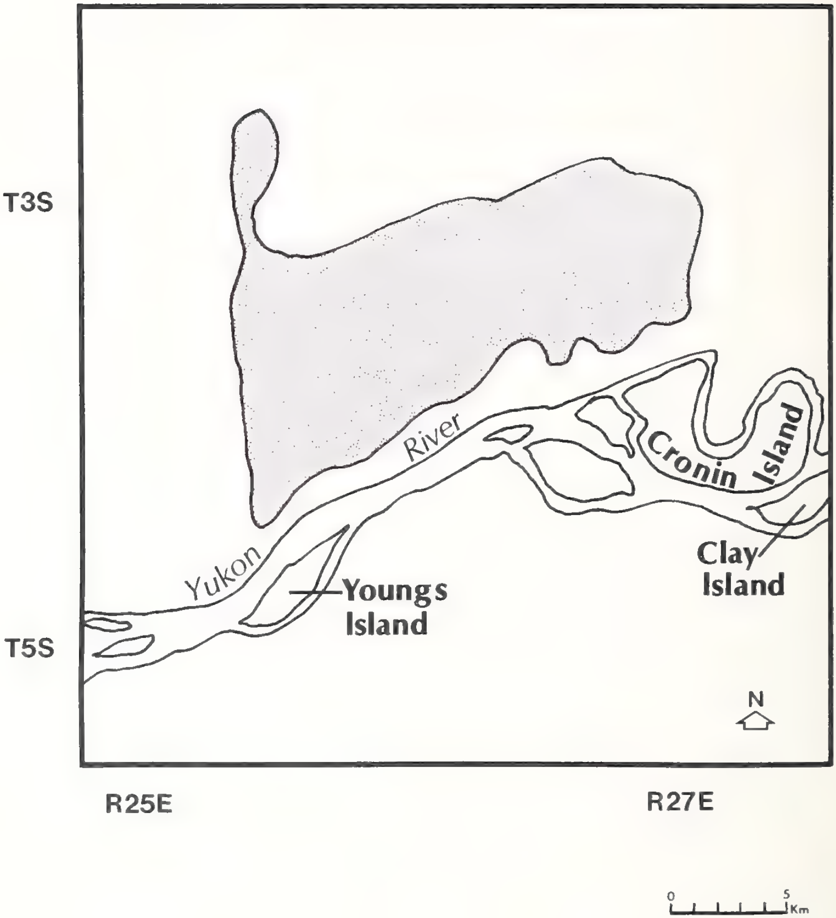
Scattered larch beetle activity

3C
Mt. McKinley
Kantishna River



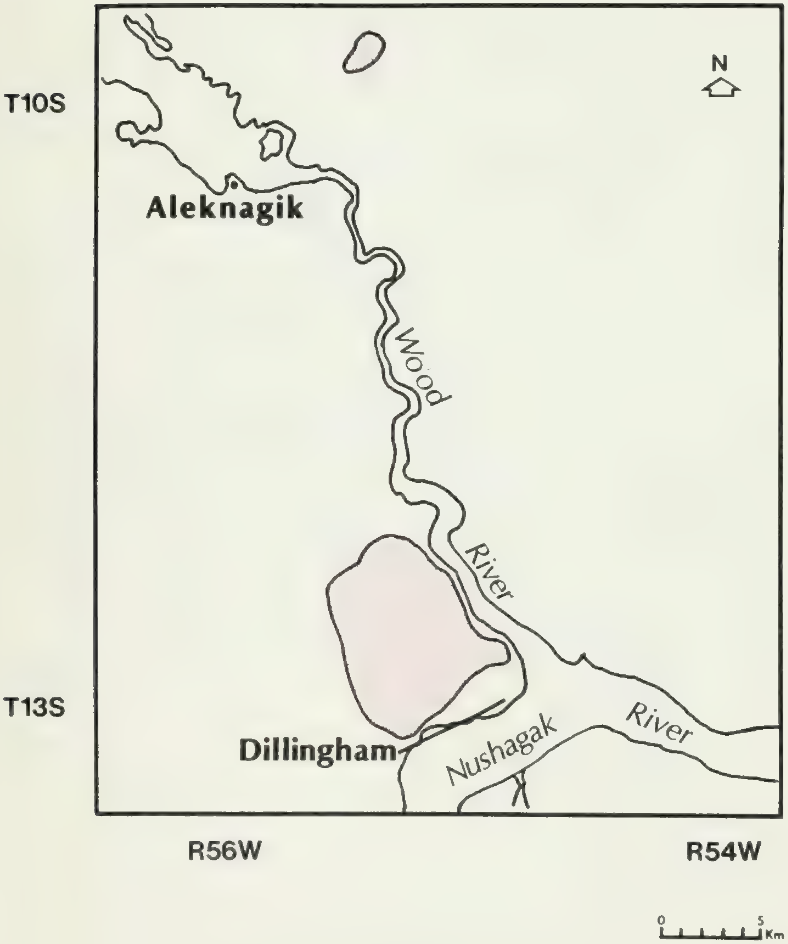
Scattered larch beetle activity

4A
Melozitna



Heavy spruce needle rust

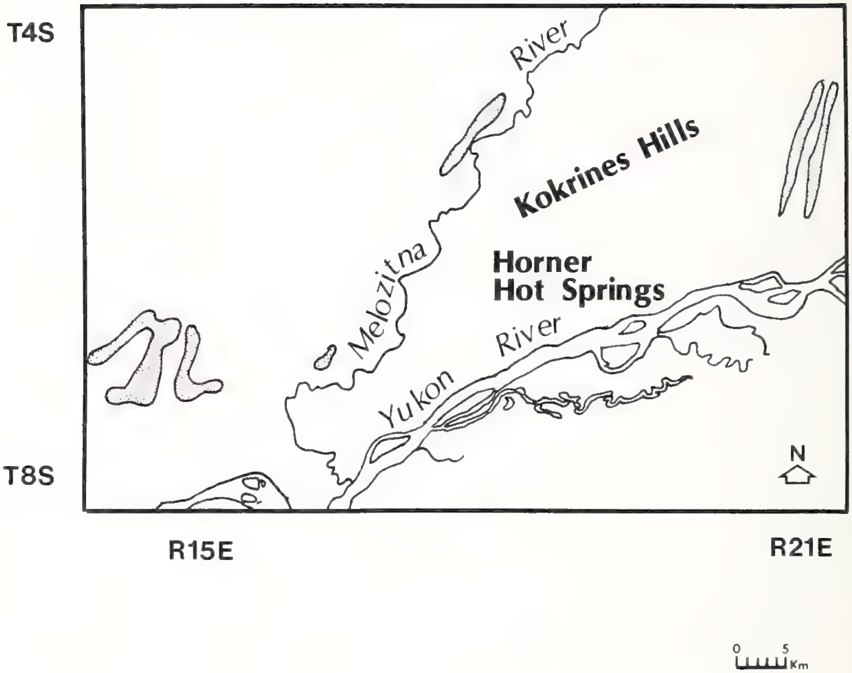
4B
Dillingham



Heavy spruce needle rust ▨

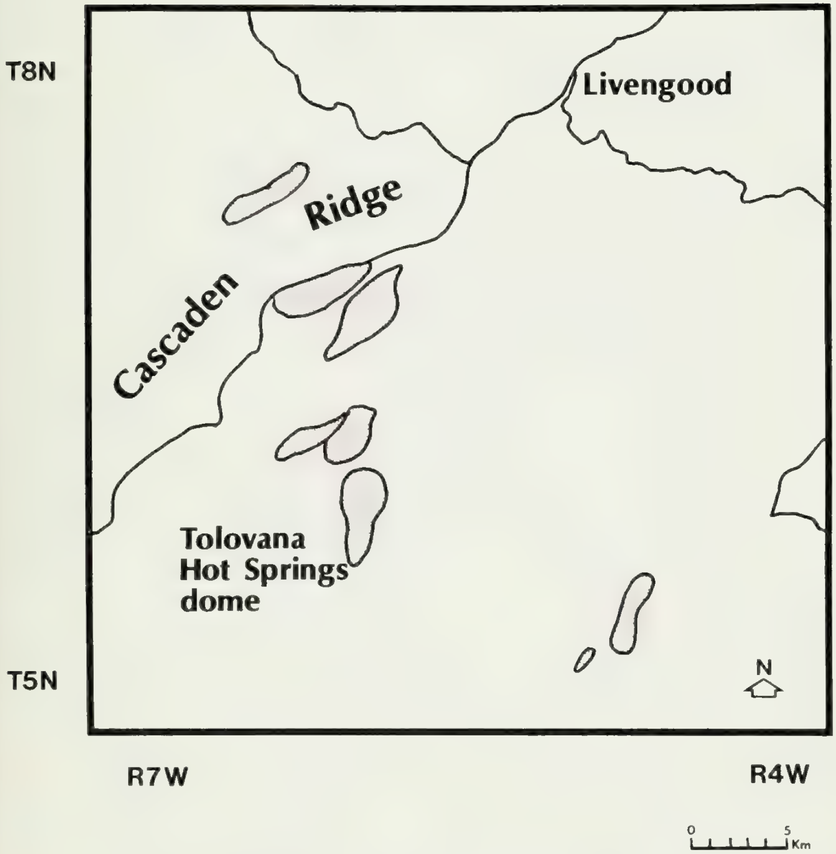
4C

Melozitna - Ruby



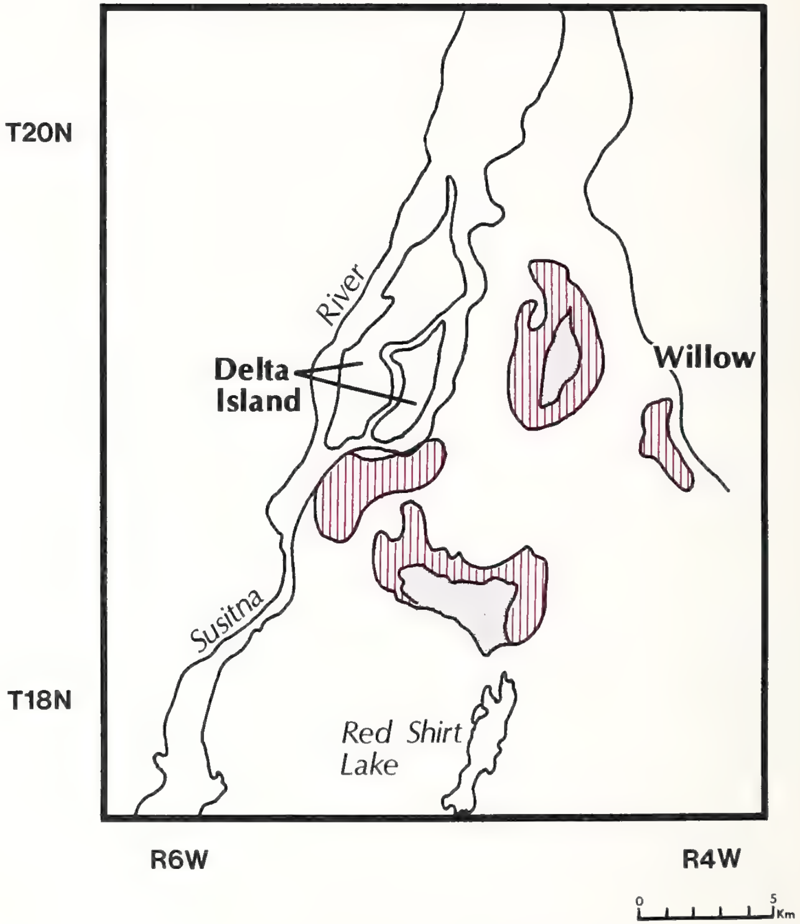
Heavy spruce needle rust

5
Livengood



Frost damage on aspen

6
Tyonek



Large aspen tortrix defoliation
– Moderate ▥
– Heavy ▒

Appendix C

Forest insect and disease surveys

Early detection of insect and disease infestations is an important part of forest insect and disease management. Detection of forest insects and diseases depends on prompt reporting by land management personnel, property owners, and forest users and on systematic surveys conducted by forest entomologists and pathologists.

In 1978, Forest Insect and Disease Management (FIDM) personnel conducted their yearly survey flights. About 80 hours (fig. 10) were spent in the air throughout southeast, south-central, and interior Alaska. This is a significant increase over the 1977 levels. We expect a further increase in forest insect and disease surveys for 1979.

But, because of the large size of Alaska forested areas and the number of FIDM personnel available for survey and detection, much additional and worthwhile information can be provided by prompt field reporting by Federal, State, and private land managers and owners. Accordingly, please report, as soon as possible, forest or urban tree insects or diseases to your local **Alaska State Forestry Office** or to one of the following addresses:

USDA Forest Service
State and Private Forestry
Pouch 6606
(2221 E. Northern Lights Blvd.,
Suite 107)
Anchorage, Alaska 99502
(Telephone 907-276-0939)

USDA Forest Service
State and Private Forestry
P.O. Box 1628
Juneau, Alaska 99802
(Telephone 907-586-7510)

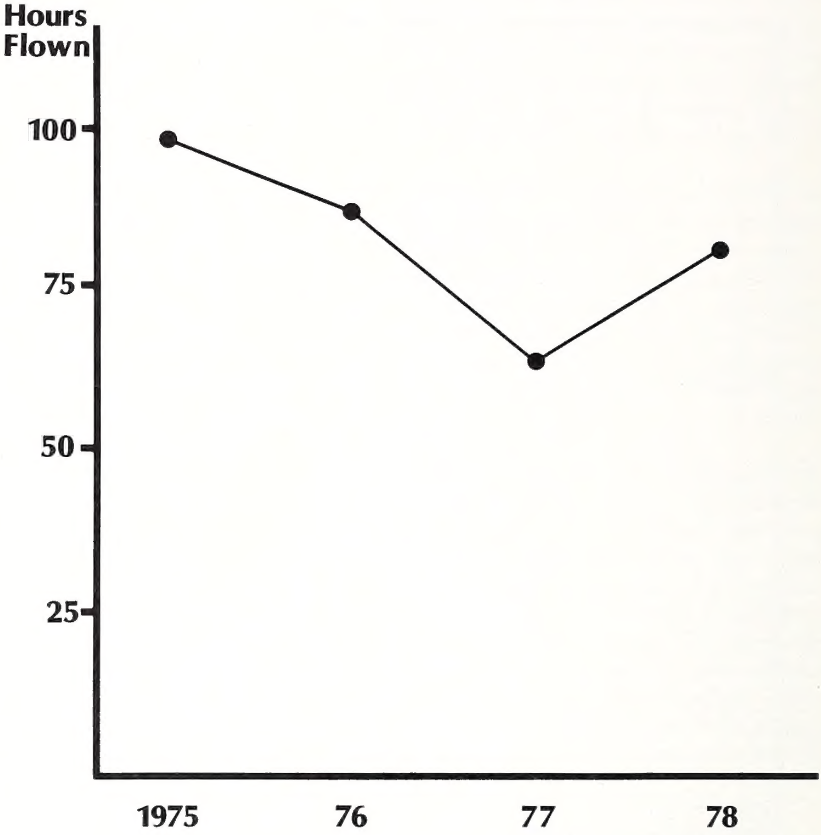


Figure 10 – Reconnaissance and survey flights for forest insect and disease management in Alaska, by duration and year.

Appendix D

Submitting insects and diseases for identification

People interested in obtaining positive identification of insect and disease specimens should submit samples to specialists. The following procedures for the collection and shipment of specimens should be followed:

- Specimen Collection.
  - Adequate material should be collected.
  - Adequate Information: The value of an insect or disease specimen depends on the information regarding its collection.
    - Where the specimen was collected: nearest Post Office or town, elevation, aspect, and so forth.
    - When the specimen was collected.
    - Who the specimen was collected.
    - Host description (age, species, and general appearance).
    - General condition of the surrounding area (fire, blowdown, logging, and so forth).
  - Personal opinion of the problem (the collector's opinion is very helpful).
- Shipment of Specimens.
  - General:
    - Pack specimens in such a manner that breakage will be minimal.
  - Insects: Specimens sent through the mail should be packed to withstand rough treatment.
    - Larvae and other soft-bodied insects should be shipped in small screw-top vials or bottles containing at least 70 percent isopropyl (rubbing) alcohol. Make certain the bottles are sealed well. Include in each vial adequate information, or a code, relating the sample to the written description and information. Labels inserted in the vial should be written on with pencil or India ink. Do not use a ballpoint pen, as the ink is not permanent.
    - Pupae and hard bodied insects map be shipped either alcohol or in small boxes. Specimens should be placed between layers of tissue paper in the shipping boxes. Pack carefully and make certain that there is very little movement of material within the box. Do not pack insects in cotton.
    - Adult moths, butterflies, and fragile insects should be folded between paper befor packing in the tissue paper.
  - Needle Diseases:
    - Do not ship in plastic bags.
    - Sprinkle lightly with water before wrapping in newspaper.
  - Shipping:
    - Ship as quickly as possible. If samples cannot be shipped rapidly, store them in a refrigerator.
    - Include address inside shipping carton.
  - Mark: "FRAGILE: INSECT-DISEASE SPECIMENS ENCLOSED FOR SCIENTIFIC PURPOSES ONLY; NO COMMERCIAL VALUE."

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Forest Service, Alaska Region
Office of Information
P.O. Box 1628
Juneau, Alaska 99802

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